Chapter 7.0
Indirect and Cumulative Effects

The Federal Transit Administration (FTA) and Maryland Transit Administration (MTA) assessed the potential indirect (secondary) and cumulative effects of the Preferred Alternative in accordance with the National Environmental Policy Act and Council on Environmental Quality (CEQ) regulations.

Indirect (or secondary) effects are defined as "effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR 1508.8(b)).

Cumulative effects are defined as the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). Cumulative effects include the direct and indirect impacts of a project together with the past, present, and reasonably foreseeable future actions of others.

7.1 Methodology

The analysis is consistent with the CEQ's 1997 *Considering Cumulative Effects under the National Environmental Policy Act* and Maryland State Highway Administration's (SHA) 2007 *Indirect and Cumulative Effects Analysis Guidelines for Environmental Impact Statements and Environmental Assessments and Categorical Exclusions*. SHA is a sister agency of MTA under the Maryland Department of Transportation. The guidelines offer a consistent framework for the analysis and consideration of indirect and cumulative effects associated with transportation projects in Maryland.

A combination of analysis methodologies was employed to fully assess and quantify indirect and cumulative effects, using readily available information and data including the following:

- **Trends Analysis**—Used to identify effects occurring over time and to project the future context of land use and environmental resources of interest.
- **Map Overlays**—Quantitative and qualitative analysis using layering of maps showing land use and resource context from various time periods. The patterns of past, existing, and future land use and the effects of development on resources of interest were analyzed to forecast future trends.

Primary data sources for this indirect and cumulative effects analysis included the following:

- Maryland Department of Planning: 1973, 2002, and 2010 Statewide Land Use
- District of Columbia: 2004 Land Use
- M-NCPPC General and Sector Plans
- Montgomery and Prince George's Counties and Washington DC GIS data
- MWCOG: Future employment projections for the Washington region through the Cooperative Forecasting Program (Round 8.0A, revised for 2011).

Primary data sources were supplemented as necessary with additional data collection, aerial mapping, and coordination with the staffs of the primary data source agencies.

The indirect and cumulative effects analysis follows the basic assessment steps identified in the CEQ and SHA guidance:

- Identify resources of interest
- Establish geographic and temporal boundaries
- Determine past, present, and reasonably foreseeable future projects to be assessed as part of the indirect and cumulative effects analyses
- Assess indirect and cumulative effects to resources of interest within the defined geographic and temporal boundaries

7.1.1 Identify Resources of Interest

Resources selected for analysis include those that would be affected directly by the Preferred Alternative, those that would be affected by potential indirect development associated with the station locations, those that are particularly susceptible to cumulative effects, and those that have the potential to experience individual impacts from the Purple Line, as well as one or more other projects over time that, in aggregate, result in a cumulative effect. Transportation is presented in this analysis in terms of the role it plays in affecting other resources. The resources assessed in the indirect and cumulative effects analysis are the following:

- Neighborhoods and Community Facilities and Services
- Environmental Justice
- Parks and Recreation Facilities
- Cultural Resources
- Forests
- Floodplains
- Water Resources
- Wetlands

7.1.2 Establish Geographic and Temporal Boundaries

Geographic Study Areas

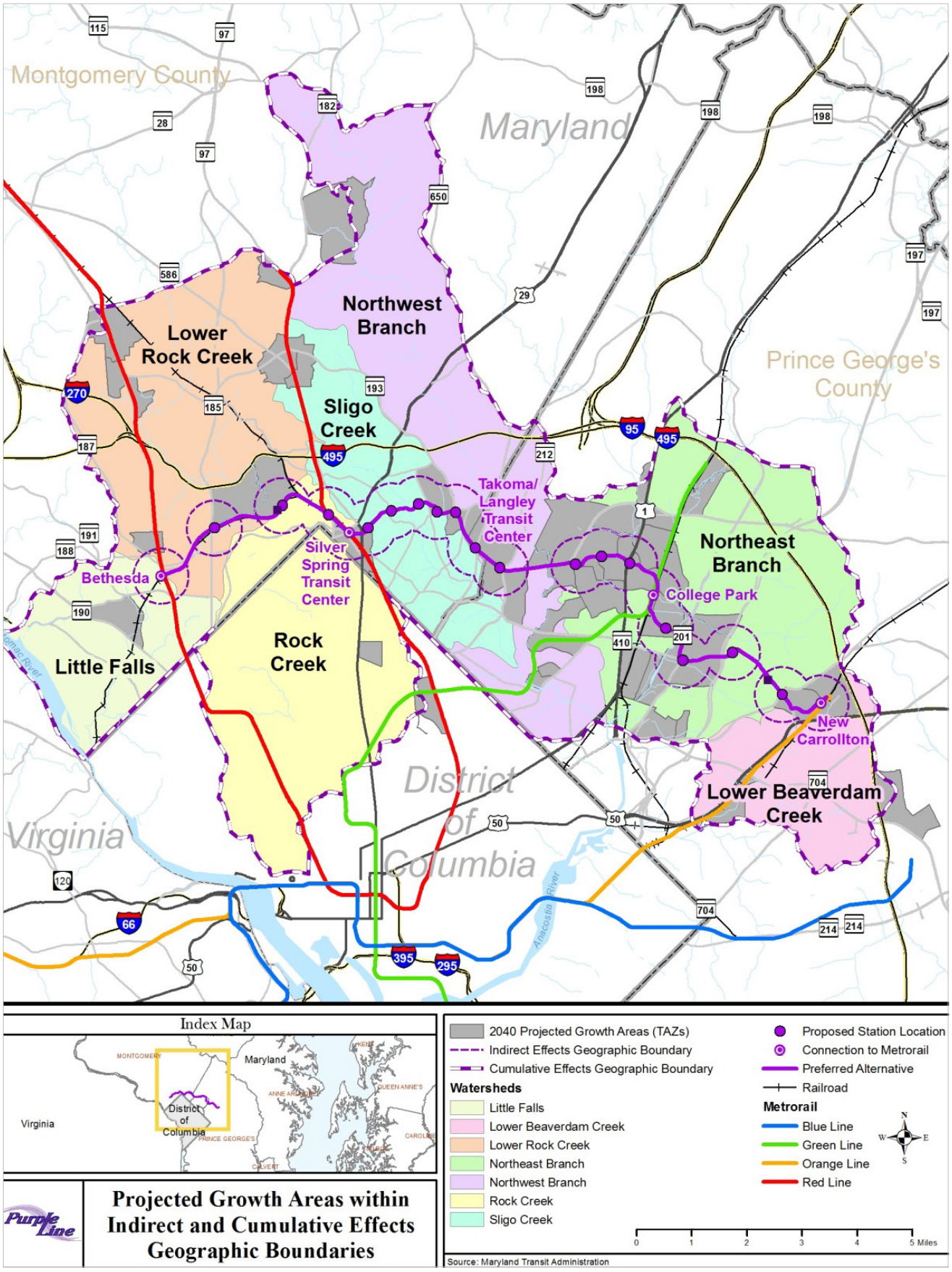
The indirect effects study area is the portion of the corridor that potentially would be affected by development induced by the construction and operation of the Purple Line. As discussed in Section 4.2, zoning supports opportunities for redevelopment and for TOD around many of the stations, which would emphasize a pedestrian-friendly, mixed-use environment. In this context, the indirect effects study area is defined by a reasonable walking distance around station areas of approximately one-half-mile (Figure 7-1). One-half mile is the generally accepted maximum distance that transit patrons typically would walk to a station, based on an average walking speed between 2 and 3 miles per hour and a 10-minute time period. This "walkshed" standard encompasses an area of about 500 acres. As patrons would have no direct access to the Purple Line transit system apart from the stations, the Preferred Alternative would not be expected to induce development beyond these station areas.

The indirect effects study area is focused around the Purple Line because potential induced effects, such as effects on built environment: businesses, environmental justice populations, traffic, and historic properties, typically occur in close proximity to a light rail transit project.

The cumulative effects study area, also shown on Figure 7-1, is a larger geographic area than the indirect effects study area because it encompasses resources, primarily natural resources, which are potentially affected by multiple projects considered in aggregate. For example, the effect of multiple projects on floodplains was examined on a watershed-wide basis to determine the effect of all projects on the capacity of existing floodplains (acreage of available floodplains) to provide flood control.

FTA and MTA determined the cumulative effects study area by overlaying maps of the resources of interest (water resources, floodplains, wetlands, parks, and forested land) to determine the geographic area that captures potential cumulative effects. In this way, FTA and MTA determined that the seven subwatersheds that intersect the proposed transitway, which define the boundaries of the floodplains, water resources, and wetlands, form the largest geographic area, including the other, smaller resource areas (forested land and parks) and the indirect effects study area.

Figure 7-1. Indirect and Cumulative Effects Geographic Boundaries and Projected Growth Areas



Thus, the cumulative effects study area is defined by the subwatersheds of Little Falls, Rock Creek, Lower Rock Creek, Sligo Creek, Northwest Branch, Northeast Branch, and Lower Beaverdam Creek.

Temporal Boundaries and Present Definitions

The time frames established for the cumulative effects analysis include a past time frame of 1964 to the present and a future time frame of the present to 2040. Within the analysis, present actions are those defined to occur between 2012 and 2018. Year 2018 is the latest year that county-level capital improvement project and budget information is available.

The past cumulative effects time frame was determined by examining population trends and previous key events of influence on land use and transportation in the cumulative effects study area. Prior to 1960, Washington DC was the major area of population in the region. After 1960, the population of the city experienced a declining trend.

Meanwhile, the regional population increased 67 percent (1960-2010), led by substantial increases in population in surrounding Montgomery and Prince George's Counties (Table 7-1). In 1964, the Capital Beltway (I-495) opened to traffic, and the Maryland-National Capital Park and Planning Commission (M-NCPPC) document, *On Wedges and Corridors, A General Plan for the Maryland-Washington Regional District in Montgomery and Prince George's Counties* was published. These events have influenced the land use and growth patterns of the region since that time.

The future cumulative effects time-frame, from 2018 to 2040, is bounded by the extent of regionally-approved population and land use projections available through the Metropolitan Washington Council of Governments (MWCOG). As Table 7-2 shows, over the 30 years from 2010 to 2040, continued growth is projected for the overall area. However, the total percentage of residential growth in the two counties will be substantially less than during the 50 years from 1960 to 2010, while

Table 7-1. Area Population Trends, 1940 to 2010

Year	Montgomery County	Prince George's County	Washington DC	Overall Area
1940	83,912	89,490	663,091	836,493
1950	164,401	194,182	802,178	1,160,761
1960	340,928	357,395	763,956	1,462,279
1970	522,809	661,719	756,510	1,941,038
1980	579,053	665,071	638,333	1,882,457
1990	757,027	728,553	606,900	2,092,480
2000	873,341	801,515	572,059	2,246,915
2010	971,777	863,420	601,723	2,436,920
Percent Change 1960-2010	185%	142%	-21%	67%
Average Annual Growth Rate	15%	12%	-0.1%	2.7%

Sources: Montgomery and Prince George's Counties—Historical Census Browser from the University of Virginia, Geospatial and Statistical Data Center. Retrieved January 2012. http://mapserver.lib.virginia.edu/collections
Washington, DC—Resident Population Data, *United States Census Bureau. Retrieved January 2012.* http://2010.census.gov/2010census/data/apportionment-pop-text.php

Table 7-2. Area Population Projections, 2010 to 2040

Year	Montgomery County	Prince George's County	Washington DC	Overall Area
2010	979,996	846,171	605,513	2,433,690
2015	1,016,996	873,103	651,526	2,543,640
2020	1,064,995	895,742	669,790	2,632,547
2025	1,108,997	913,402	693,825	2,718,249
2030	1,151,997	928,281	711,890	2,794,198
2035	1,181,997	939,908	730,363	2,854,303
2040	1,198,997	950,119	760,538	2,911,694
Percent Change 2010-2040	22%	12%	26%	20%
Average Annual Growth Rate	0.7%	0.4%	0.8%	0.7%

The 2010 data are estimates developed by MWCOG based upon 2000 Census data. These data projections were developed with the same methodology as the 2040 projections and are the best set of data to use to understand the projected change in population between 2010 and 2040

Source: Metropolitan Washington Council of Governments, Round 8.0a Cooperative Forecasts, Population and Household Forecasts to 2040 by TAZ, 2011

residential growth in Washington DC will reverse the decline of those 50 years. Much of the growth throughout the area will occur as redevelopment with increasing development densities allowed by revised zoning regulations, as only approximately 10 percent of the cumulative effects study area is undeveloped.

Within the cumulative effects study area, population is projected to increase by 18 percent between 2010 and 2040, and employment is projected to increase by 24 percent (Table 7-3).

7.1.3 Past, Present, and Reasonably Foreseeable Future Projects

Past Projects

Following World War I and II, expansion of the federal government infrastructure in Washington DC was the major growth factor in the region, with the District reaching its peak population in 1950. At the same time, Montgomery and Prince George's Counties continued to be generally more rural in nature, but with a growing suburban land use context adjacent to the District. However, transportation access constraints between the District and the surrounding counties generally limited development growth.

Beginning in the 1960s, significant efforts by federal, state and county agencies began to improve regional mobility in order to accommodate the projected influx of new residents. As shown in Table 7-1, annual population growth was 15 percent in Montgomery Count and 12 percent in Prince George's County. These new residents were drawn by expanding federal government jobs and emerging opportunities in the private sector; many opportunities were targeted toward supporting defense and other federal sectors.

The following are the major transportation projects, land use policies, and events that contributed to the changes in land use patterns and resource context within the region between 1964 and 2012:

- **1964**—M-NCPPC published *On Wedges and Corridors, A General Plan for the Maryland-Washington Regional District in Montgomery and Prince George's Counties*
- **1964**—Capital Beltway (I-495) completed
- **1969**—Groundbreaking for Metrorail system
- **1972**—Capital Beltway expanded to eight lanes east of Georgia Avenue in Silver Spring
- **1978**—Metrorail Red Line extended to Silver Spring; Metrorail Orange Line to New Carrollton opens
- **1984**—Metrorail Red Line extended to Bethesda
- **1990**—Capital Beltway expanded to eight lanes from Georgia Avenue west to Rockville Pike/Wisconsin Avenue
- **1993**—Metrorail Green Line opens with a station at College Park/University of Maryland (UMD)
- **2011/2012**—Intercounty Connector toll road opens across central Montgomery and Prince George's counties

Table 7-3. Overall Cumulative Effects Study Area 2010-2040 Population and Employment Projections

Cumulative Effects Study Area Subwatersheds	2010 Population Estimate	2040 Population Forecast	2010-2040 Percent Change	2010 Total Employment Estimate	2040 Total Employment Forecast	2010-2040 Percent Change
Little Falls	45,017	51,840	15%	26,313	30,803	17%
Rock Creek	203,990	234,742	15%	129,540	145,116	12%
Lower Rock Creek	110,030	150,717	37%	90,616	119,648	32%
Sligo Creek	86,780	98,838	14%	22,988	25,784	22%
Northwest Branch	122,414	129,470	6%	18,445	24,723	34%
Northeast Branch	111,561	140,738	26%	78,443	103,279	32%
Lower Beaverdam Creek	42,650	46,831	10%	23,767	32,610	37%
Cumulative Effects Study Area Totals	722,442	853,176	18%	390,112	481,963	24%

Source: Metropolitan Washington Council of Governments, Round 8.0a Cooperative Forecasts, Population and Household Forecasts to 2040 by TAZ, 2011

These transportation projects, and the planning efforts focusing on development along the transportation corridors and at the Metrorail stations, encouraged development in Montgomery and Prince George's Counties. As shown in Table 7-1, the development allowed for an annual population growth of 15 percent in Montgomery County and 12 percent in Prince George's County.

Present and Reasonably Foreseeable Future Projects

Present projects as well as other public actions planned and programmed to be completed by 2040 within the indirect and the cumulative effects study areas have been identified. Table 7-4 lists the public and private projects by station area in the indirect effects study area that are considered in the analysis of both indirect effects and cumulative effects, and Table 7-5 lists the additional public projects considered in the cumulative effects analysis that are outside the indirect effects study area.

In addition to the consideration of public actions, land use projections were analyzed at the traffic analysis zone (TAZ) level to identify areas for potential future private growth in both the indirect and cumulative effects study areas. TAZ's with growth exceeding 50 percent between 2010 and 2040 for households, population, or total employment were identified as potential growth areas (PGA). This enabled the analysis to focus on those areas most likely to experience future growth and potential cumulative effects on resources of interest. In general, the potential growth areas are near the Preferred Alternative and other transportation corridors (Figure 7-1). Using the MWCOG forecasts, FTA and MTA identified 59 TAZs (of the 333 within the cumulative effects study area) as potential growth areas. These TAZ's are projected to accommodate approximately 70 percent of population growth and 68 percent of employment growth within the cumulative effects study area between 2010 and 2040.

7.2 Indirect Effects Assessment

Market demand, local planning, and transit-oriented development (TOD) policies, land availability, and support infrastructure are factors that determine the location and type of growth in the indirect effects study area. Where Purple Line stations are located with existing Metrorail stations, past, present, and foreseeable planned development and redevelopment projects are primarily spurred by Metrorail service (WMATA, 2011). In these station areas, as well as the Silver Spring Library station area, the identified planned developments are not induced by the Purple Line project, but by the long-standing and on-going catalytic effects of Metrorail service on regional growth patterns. In station areas where no changes are foreseen in existing land use and zoning, such as Dale Drive, Manchester Place, and UM Campus Center, or where future redevelopment has been planned independent of the Purple Line, such as East Campus, Purple Line stations would not be expected to induce changes in development patterns.

In the other station areas of Chevy Chase Lake, Lyttonsville, Woodside/16th Street, Long Branch, Piney Branch Road, Takoma/Langley Transit Center, Riggs Road, Adelphi Road/West Campus, M Square, Riverdale Park, Beacon Heights and Annapolis Road/Glenridge, the Purple Line would have the potential to induce development. In many cases, state initiatives and local land use planning and zoning actions undertaken in parallel with the development of the Preferred Alternative anticipate the benefits of the Purple Line by facilitating mixed-use redevelopment around the stations, often at higher densities. It is important to understand that actual station-area development may not occur at the densities proposed by current plans. In addition to the possibility that the plans may be revised, future development may be limited by various factors including market conditions, developer preferences, environmental permitting issues, and infrastructure availability.

Potential indirect effects of land use and development could include localized increased business expenses (e.g., rents) from increased property values, business migration and displacement, changes in the availability and affordability of housing stock, and changes in neighborhood character in the indirect effects study area. These potential effects could be felt most acutely by environmental justice populations in the indirect study area.

Table 7-4. Present and Reasonably Foreseeable Future Projects within the Indirect and Cumulative Effects Study Area

Agency	Project	Description	Subwatershed
Bethesda Station			
Montgomery County	Bethesda Bikeway and Pedestrian Facilities	Within Bethesda CBD	Little Falls & Lower Rock Creek
	Bethesda Metro South Entrance	New south entrance from Elm Street west of Wisconsin Avenue	Little Falls
	Bethesda Elementary	Expansion	Little Falls
	Bethesda-Chevy Chase High School	Expansion	Lower Rock Creek
	2nd District Police Station	Replacement	
	Bethesda Streetscape	Pedestrian improvements	
	Bethesda Parking Renovations	Renovations to existing parking facilities	
Montgomery County & Private	Bethesda Lot 31 Parking Garage	A mixed use development of 250 residential units, 40,000 sq. ft. of retail, and 940 spaces of public parking	Lower Rock Creek
Private	Woodmont East	Approximately 1.2 million square feet of retail, office, and hotel uses, with 210 multi-family dwelling units	Little Falls
Chevy Chase Lake Station			
Montgomery County	North Chevy Chase Elementary School	Expansion	Lower Rock Creek
	Platt Ridge Drive Extended	Local roadway extension	
Private	Chevy Chase Lake Redevelopment	Approximately 1.5 million square feet of commercial/retail development and 1,000 housing units	Lower Rock Creek
Lyttonsville			
Montgomery County	Rosemary Hills Elementary School	Expansion	Rock Creek
Woodside/16th Street Station			
Private	Spring Center Redevelopment	TOD redevelopment of retail center with development of Woodside/16th Street Station	Rock Creek
M-NCPPC	Woodside Urban Park	Renovation of facilities	Rock Creek
Silver Spring Transit Center Station and Silver Spring Library Station			
Montgomery County	Silver Spring Green Trail	Silver Spring Metro Station to Sligo Creek Hiker-Biker Trail	Rock Creek & Sligo Creek
	Silver Spring Traffic Improvements	CBD roadway improvements—Dale Drive to Colesville Road	
	Silver Spring Library	Six-story library including retail incorporating a Purple Line station	Sligo Creek
	Silver Spring Transit Center	Six-story mixed-use transit center	Rock Creek
	Silver Spring Parking Renovations	Renovations to existing parking facilities	Rock Creek & Sligo Creek
	Fenton Street Village	Improved pedestrian linkages	Sligo Creek
	Metropolitan Branch Trail	Trail from Silver Spring to Takoma Park	
Private	Fenton Street Development	New place of worship and associated educational buildings and single-family dwelling units	Sligo Creek
	Silver Spring Urban Renewal	High density office and retail commercial buildings, including hotel and apartment complex	
	8621 Georgia Avenue—Silver Spring	Proposed 13-story office building with retail and parking facilities	

Table 7-4. Present and Reasonably Foreseeable Future Projects within the Indirect and Cumulative Effects Study Area (continued)

Agency	Project	Description	Subwatershed
Dale Drive Station			
Montgomery County	Dale Drive Sidewalk	New sidewalk construction from Mansfield Road to Hartsford Avenue	Sligo Creek
	Old Blair Auditorium	Renovation	
Manchester Place Station			
Montgomery County	Highland View Elementary School	Expansion	Sligo Creek
Long Branch Station and Piney Branch Station			
Montgomery County	Flower Avenue Green Street	Street reconstruction	Sligo Creek
Takoma/Langley Transit Center Station			
MTA	Takoma/Langley Transit Center	New bus transit center- University Boulevard at New Hampshire Avenue	Northwest Branch
M-NCPPC	Langley Park Community Center	Renovations	Northwest Branch
Riggs Road Station			
None			
Adelphi Road/West Campus Station, UM Campus Center Station, and East Campus Station			
University of Maryland	UMD East Campus Redevelopment Initiative	38-acre mixed-use development with retail, hotel/conference, residential, and graduate student housing	Northeast Branch
College Park Metrorail Station			
WMATA & Private	College Park Metro Development	Transit station improvements, 348,000 sq. ft. of office space, 34,000 sq. ft. of retail, 290 residential units, and a 600-space garage	Northeast Branch
M-NCPPC	Calvert Park Neighborhood Park	Reconstruction	Northeast Branch
	College Park Airport	New maintenance facility	
	Wells-Linson Complex	Renovations	
M Square Station			
Private	Cafritz Property at Riverdale Park	37-acre development with over 200,000 sq. ft. of retail and restaurants, 26,400 sq. of office space, 995 residential units, and a 120-room hotel	Northeast Branch
University of Maryland & Private	M-Square Research Park	Approximately 2 million sq. ft. of research and office facilities on 130 acres	Northeast Branch
M-NCPPC	Park and Recreation Administration	Renovations	Northeast Branch
	Riverdale Community Recreation Center	Renovations	
Riverdale Park Station			
M-NCPPC	Fletchers Field Community Park	Renovations	Northeast Branch
Beacon Heights Station and Annapolis Road/Glenridge Station			
None			
New Carrollton Metrorail Station			
WMATA & Private	New Carrollton Transit District Development	Approximately 5 million sq. ft. of offices, stores, hotels, and entertainment space, and up to 5,500 new homes	Lower Beaverdam

Table 7-5. Present and Reasonably Foreseeable Future Public Projects within the Cumulative Effects Study Area outside the Indirect Effects Study Area

Agency	Project	Description	Subwatershed
MD SHA	BRAC Intersection Improvements	Intersection improvements near National Naval Medical Center, Bethesda	Lower Rock Creek
	Randolph Road widening	Approximately 1,500 ft. of roadway widening from Rock Creek to Charles Road	
	MD 201/US 1	Roadway widening	Northeast Branch
MD SHA & Montgomery County	MD 97 (Georgia Avenue)	Interchange improvements	Lower Rock Creek
Montgomery County	Westbrook Elementary School	Expansion	Little Falls
	Wood Acres Elementary School	Expansion	
	Wapakoneta Road Improvements	Local road reconstruction	
	Viers Mill Elementary School	Expansion	Lower Rock Creek
	Chapman Road Extended	Extension of Chapman Avenue from Randolph Road to Old Georgetown Road	
	Glenmont Fire Station 18	Replacement	
	Maple Avenue Storm Drain and Roadway Improvements	Street reconstruction	
	Chevy Chase Storm Drain Improvements	Drainage infrastructure improvements	
	White Flint East Transportation	Local roadway/bridge improvements	
	White Flint West Transportation	Local roadway/bridge improvements	
	Wheaton Library	New construction	Sligo Creek
	Wheaton Rescue Squad	Relocation and new construction	
	Denis Avenue Health Center	Replacement	
	Wheaton Parking Renovations	Renovations to existing parking facilities	
	Wheaton Redevelopment Program	Wheaton CBD renewal	
	Seminary Road	Intersection improvement	
	Arcola Elementary School	Expansion	
	Northwest Golf Course	Site, layout and building renovations	Northwest Branch
MD SHA & Prince George's County	US 1, Baltimore Avenue	Roadway reconstruction — College Ave to Sunnyside Ave	Northeast Branch
	MD 201, Kenilworth Avenue	Roadway widening — Rittenhouse Road to Pontiac Street	
Prince George's County	Greenbelt Road (MD 193) Bus Enhancement	MD 650 New Hampshire Avenue to MD 564 Lanham-Severn Road	Northwest Branch & Northeast Branch
	US Route 1 Bus Enhancements	District Line to MD 198	
	Hyattsville Area Elementary School	Renovations	Northwest Branch
	Hyattsville Fire Station	Replacement	
	Gateway Arts District	Local roadway improvements	
	Margaret Brent Elementary School	Renovations	Northeast Branch
	Charles Carroll Middle School	Renovations	
	Bladensburg High School	Renovations	
	Parkdale High School	Renovations	
	William Wirt Middle School	Renovation	
	Varnum Street	Local bridge replacement	
	Greenbelt Fire/EMS Station	Replacement	
	Hyattsville Library	Renovations	
	New Carrollton Library	Renovations	
	Glenarden Woods Elementary School	Renovations	Lower Beaverdam
	Kentland Fire/EMS Station	Renovation	
	Glenarden Apartments	Demolition	

Table 7-5. Present and Reasonably Foreseeable Future Public Projects within the Cumulative Effects Study Area outside the Indirect Effects Study Area (continued)

Agency	Project	Description	Subwatershed
M-NCPPC	Chillum Community Park	Renovations	Northwest Branch
	Dueling Branch Neighborhood Park	Renovations	
	Heurich Community Park	Renovations	
	Hyattsville-Dietz Neighborhood Playground	Renovations	
	Lane Manor Community Recreation Center	Renovations	
	Mt. Rainier Nature Center	Renovations	
	North Brentwood African Heritage Museum	Renovations	
	Northwest Branch Trail	Trail bridge replacement	
	Paint Branch Golf Course	New building	
	Paint Branch Stream Valley Park	Renovations	
	Rollingcrest-Chillum Splash Pool	Renovations	
	Acredale Community Park	Renovations	Northeast Branch
	Berwyn Heights School Community Center Park	Renovations	
	Bladensburg Community Center	Renovations	
	Edmonston Neighborhood Mini Park	Renovations	
	Indian Creek Stream Valley Park	Trail renovations	
	Lake Artemesia	Renovations	
	Prince George's Plaza Community Center	Expansion	
	Public Playhouse Cultural Arts Center	Renovations	
	Rhode Island Avenue Trolley Trail	Trail construction	
	Riversdale (Calvert Mansion)	Renovation	
	Cheverly-East Neighborhood Park	Renovations	Lower Beaverdam
	Columbia Park Elementary School	Expansion	
	Kentland Neighborhood Recreation Center	Renovations	
	Palmer Park Community Center	Renovation	
District of Columbia	DC Streetcar	Streetcar service on Georgia Avenue	Rock Creek
	Walter Reed Medical Complex	Redevelopment	
	Engine 22 Fire	New construction	
	University of the District of Columbia	Renovations	
	Cleveland Park Library	Renovation	
	Engine 14 Fire	Renovations	
	DPW Fueling Stations	Renovations	
	Shepherd Elementary School	Renovations	
	Lafayette Elementary School	Renovations	
	Hearst Elementary School	Renovations	
	Engine 28	Renovations	
	Ellington School of Arts High School	Renovations	
	Powell Elementary School	Renovations	
	Roosevelt High School	Renovations	
	West Education Campus Elementary School	Renovations	
U.S. Health and Human Services	National Institutes of Health	Renovations	Rock Creek
U.S. Department of Transportation	FHWA—Rock Creek Parkway	Renovations	Rock Creek

The potential impacts to natural resources from development are a concern primarily in terms of potential water quality effects resulting from a potential increase in impervious surfaces; but where the redevelopment would be in already-developed areas the potential impact would be reduced.

Following is a discussion, by station area, of potential Purple Line indirect effects on resources of interest, including a comparison with how the station area would be anticipated to develop under the No Build Alternative. Where the indirect effects study areas associated with individual stations (1/2-mile buffer) largely overlap and share common characteristics, station discussions have been grouped together.

7.2.1 Bethesda Station

Land use patterns in this station area are strongly oriented toward the existing Metrorail station. Existing transit-oriented residential, office, and commercial uses and planned development projects, such as Woodmont East and Lot 31, would continue this pattern. As no specific developments are planned solely in anticipation of the Purple Line, the Bethesda Purple Line station would have no indirect effects on resources of interest. Development would be anticipated to be the same under both the Preferred Alternative and the No Build Alternative.

7.2.2 Chevy Chase Lake Station

The *Chevy Chase Lake Sector Plan* (M-NCPPC 2013, Draft) builds on the recommendations of the 1990 Plan and on the Purple Line by focusing development near the proposed station, and on the community's vision as stated in the plan to:

> "**Preserve** the well-established community character of Chevy Chase Lake by protecting existing residential areas, restoring Coquelin Run, and focusing new development and redevelopment in the Town Center and by defining a standard for compatibility;
>
> "**Enhance** quality of life and connectivity within and to the Chevy Chase Lake community by promoting pedestrian-oriented mixed-use development in the Town Center, improving access to different modes of transportation throughout the community; and
>
> "**Create** new choices in the Chevy Chase Lake Town Center with new opportunities for local shopping, housing, public spaces, and transit."

The plan recommends a two-step amendment to zoning. The first would precede the Purple Line and would rezone commercial properties in the Town Center along Connecticut Avenue between Chevy Chase Lake Drive and Manor Road to allow mixed residential and commercial uses.

The second, to be timed with Purple Line funding, would allow over one million square feet of new mixed-use development in remaining Town Center properties. This expanded level of development would allow more housing options and community amenities such as parks and trails.

As the Purple Line has been incorporated as an integral part of this plan, it can be said to induce the projects of the second step in the zoning amendments that would redevelop an urbanized area. The positive effects of this development would be to improve the quality of life and the economy of Chevy Chase Lake. It is anticipated that any negative impact to water quality from the increased development would be avoided through the requirements of state and federal water quality regulations and the stated intent of the community to restore Coquelin Run.

The benefits of the second step in the rezoning and redevelopment of Chevy Chase Lake foreseen by the Chevy Chase Sector Plan would not be realized under the No Build Alternative.

7.2.3 Lyttonsville Station

The M-NCPPC initiated work on a *Greater Lyttonsville Sector Plan* in July 2012 to develop a Lyttonsville community vision incorporating the Purple Line, the relocation of the Lyttonsville Yard site in response to community comments, and locally-desired changes to the commercial/industrial area along Brookville Road. Redevelopment of existing commercial and light industrial

properties would have the potential to displace small businesses, some of which may be minority-owned. Indirect effects to area businesses possibly would include changes to the intensity of development or the timing of proposed development, due to modifications in access and traffic patterns that would occur with the construction of the Purple Line.

The Preferred Alternative also is expected to have long-term positive effects to the economy within the indirect effects area, including additional businesses migrating to the station area to serve transit users and area residents. Effects on local employment also would be beneficial. Future development would create more jobs for local residents and increase available housing in the area. No new transportation-related catalyst for redevelopment would occur in the No Build Alternative. Thus, limited additional employment and increase in housing are anticipated to occur. On the positive side, the No Build Alternative would cause no substantial change in impervious surface area related to new development. As a result, the No Build Alternative incurs minimal concern regarding potential water quality effects.

7.2.4 Woodside/16th Street Station

The *North and West Silver Spring Master Plan* (M-NCPPC 2000) envisions high-density, mixed-use development in the northern portion of the Woodside/16th Street station area, with high density, multi-family residential to the south. Since MTA would acquire a portion of the Spring Center, a shopping center between 16th Street and the Metropolitan Branch right-of-way, for the Purple Line station, the land owner has expressed interest in redeveloping the remaining 6.5-acre site as TOD. Redevelopment of the center would benefit the community through increased employment opportunities and by bringing additional businesses and services to local residents. Since the land to be potentially redeveloped is a shopping center with extensive paved parking areas, there is little risk of increased impervious surfaces being created.

Lands bounded by East-West Highway and the CSX corridor, including the proposed station area, are also included within the current *Greater Lyttonsville Section Plan* initiative.

Development of high-density mixed use in the northern portion of the Woodside/16th Street station area would be expected under either the Preferred Alternative or the No Build Alternative because the area is adjacent to downtown Silver Spring, but, in the latter event, the development would take place over a longer period of time. Under the No Build, the Spring Center would not be replaced in part by a transit station and the balance of the site would not be redeveloped.

7.2.5 Silver Spring Transit Center and Silver Spring Library Stations

The combined indirect effects study area surrounding the Silver Spring Transit Center and Silver Spring Library stations is a revitalized urban core, which continues to intensify in density as part of on-going efforts by the county and private developers. The *Silver Spring CBD and Vicinity Sector Plan* (M-NCPPC 2000) encourages multi-use development within downtown Silver Spring, including retail, residential, office, hotel, and civic uses around the connected public transportation systems. While the Preferred Alternative would add transit connections, land use and development patterns are most strongly linked to the existing Metrorail station and local business enterprises. None of the projected future development in the study area is identified as induced by the proposed Purple Line, and no indirect effects on resources of interest would occur.

Development would be anticipated to be the same under both the Preferred Alternative and the No Build Alternative.

7.2.6 Dale Drive

The *East Silver Spring Master Plan* (M-NCPPC 2000) does not call for changes in the existing development character or uses in the Dale Drive station area. The community surrounding the station is largely a residential neighborhood zoned for single-family residences with a school campus. No vacant or underutilized parcels are currently available. No induced development or project

related indirect effects are anticipated in the Dale Drive station area.

As the neighborhood is fully-developed and stable, no additional development would be anticipated under either the Preferred Alternative or the No Build Alternative.

7.2.7 Manchester Place Station

As with the Dale Drive station, the *East Silver Spring Master Plan* does not call for changes in existing development character or uses in this station area, a predominantly residential neighborhood. No induced development or project-related indirect effects are anticipated to result from the Purple Line in the Manchester Place station area.

As the neighborhood is fully-developed and stable, no additional development would be anticipated under either the Preferred Alternative or the No Build Alternative.

7.2.8 Long Branch and Piney Branch Road Stations

These station areas exhibit a mix of single-family homes and multi-family apartment complexes, with neighborhood commercial uses such as gas stations and small retail stores. The indirect effects study area associated with these stations is also within the state-designated Takoma Park/Long Branch Enterprise Zone. Businesses that choose to locate or redevelop property in the Enterprise Zone may be eligible for property and income tax credits, impact fee exemptions, and special permitting programs.

As a complement to the local zoning and Enterprise Zone inducements, the Purple Line would be a strong catalyst for public and private revitalization of underutilized properties. For example, it likely would trigger redevelopment of the northwest quadrant of the Arliss Street/Piney Branch Road intersection and the northeast and northwest quadrants of the Piney Branch Road/University Boulevard intersection.

Each of these sites is identified as interim development sites (i.e., before the Purple Line) in the *Long Branch Sector Plan* (M-NCPPC 2013 draft). The area including the Arliss Street/Piney Branch Road intersection is part of the envisioned Long Branch Town Center, an area of mixed uses between Flower Avenue and Arliss Street, with a focus on neighborhood commercial uses with new public space and parking amenities. The Piney Branch Neighborhood Village interim development would include the northeast quadrant of the Piney Branch Road/University Boulevard intersection. This area is envisioned as a higher-density residential community with diverse housing options and supporting commercial uses.

Each of these locations contains either small retail centers or individual commercial buildings, which are currently underutilized or in need of improvements. The combination of public planning, fiscal incentives, dense residential neighborhoods, and future transit improvements provide desirable conditions for future redevelopment, which would change the local neighborhood through increased pedestrian and vehicular traffic, and land use implications such as changes in local businesses and housing and increased property values. The interim developments identified in the Sector Plan are noted candidates for redevelopment and call for infrastructure improvements and development that is not predicated upon construction of the Purple Line. However, construction of the Purple Line would further encourage action on these land use plans.

If the Purple Line is constructed, the Sector Plan also envisions additional development within the Long Branch indirect effects study area, including additional housing, commercial use, and public space/parkland designed to further transform the area into a pedestrian-scale urban environment linked to public transit. Potential indirect effects in these station areas would include changes to the intensity of development or the timing of proposed development, due to modifications in access and traffic patterns that would occur with the construction of the Preferred Alternative. The Preferred Alternative is expected to have long-term positive effects to the economy within the indirect effects study area. Such development would create more area jobs, increase available area housing, improve mobility and accessibility for commuters, increase access to potentially higher-paying employment

opportunities for local residents, and increase customer markets for local businesses.

A potential indirect effect to environmental justice populations would be a reduction in available affordable housing as a result of the redevelopment of existing housing and increased commercial rents and increased commercial property values. However, the Sector Plan calls for approximately 700 additional subsidized housing units in the interim (i.e., independent of the Purple Line) and an additional 1,100 subsidized housing units over the long-term (i.e., post-Purple Line construction).

The Sector Plan calls for additional public green space and vegetated buffers, along with LEED building design, to reduce stormwater runoff generation.

Under the No Build Alternative, the long-term positive benefits of the Preferred Alternative would not be realized, nor would the risks of a reduction in affordable housing.

7.2.9 Takoma/Langley Transit Center and Riggs Road Stations

These stations serve the Takoma Langley Crossroads area, which straddles the Montgomery County and Prince George's County boundary. The planned Takoma/Langley Transit Center and Purple Line station at the intersection of University Boulevard and New Hampshire Avenue and the Purple Line operating on University Boulevard are envisioned as the catalysts for redevelopment of the existing suburban style commercial retail uses corridor.

The *Montgomery County Takoma Langley Crossroads Sector Plan* (M-NCPPC 2010) promotes improved pedestrian safety, connections to public transportation, broadened housing opportunities, preservation of existing affordable housing, and strengthened economic opportunities for businesses through innovative commercial and residential zoning and urban design concepts, which encourage new business investment, jobs creation, attractiveness of commercial areas, and a diversity of goods and services.

The plan envisions a total of 340,000 square feet of office space, 460,000 square feet of retail/commercial, and 2,800 residential dwelling units within Montgomery County. This transition would emphasize multi-story development and increase land devoted to office space, while reducing retail and residential uses in comparison to existing conditions.

The *Prince George's County Takoma Langley Crossroads Sector Plan* (M-NCPPC 2009) seeks to achieve a transit-oriented and pedestrian-friendly community that celebrates and builds upon the cultural diversity of the existing and future residents of the Takoma/Langley Crossroads. Its goals are to increase housing retention and choices; promote its image as the "International Corridor;" create a safe, clean, and green community around future transit; improve the local economy; create a pedestrian friendly community; and provide a variety of community and recreation spaces.

The plan envisions a total of 675,000 square feet of office space, 1.5 million square feet of commercial retail, and 10,400 residential housing units. Within Prince George's County, redevelopment would emphasize office space development, with minimal increases in retail and residential uses.

These station areas are also within the state-designated Takoma Park/Long Branch Enterprise Zone.

The planned redevelopment of the indirect study area could increase pedestrian activity and increase property values. Visually, the neighborhood would become more urban, with buildings constructed on the front property line and parking in structures or mid-block lots.

As the catalyst for implementation of these plans, the Preferred Alternative is expected to have long-term positive effects to the economy. Future development would create more jobs for local residents and improve mobility and accessibility for commuters. Potential indirect effects to environmental justice populations include increased business expenses (e.g., rents) from increased commercial property values. These effects may be offset to varying degrees through increased customer markets for local businesses. For example,

implementation of Montgomery County's Takoma Langley Crossroads Sector Plan calls for broadening local commercial and housing opportunities, thereby potentially increasing the customer markets for local businesses.

Two National Register of Historic Places (NRHP) resources are present in the indirect effects study area, the McCormick-Goodheart Mansion and the Davis-Warner house (See Section 4.7 Historic Properties). As both properties are outside the area where redevelopment is anticipated, the Purple Line likely would not have an indirect effect on these resources.

As a result of the construction of the Takoma/Langley Park Transit Center and the Takoma Langley Crossroads Sector Plans adopted by both counties, there will be redevelopment in this area. However, it can be anticipated that this redevelopment would occur sooner and with higher densities under the Preferred Alternative than under the No Build Alternative.

7.2.10 Adelphi Road/West Campus, UM Campus Center, and East Campus Stations

The Preferred Alternative would contribute indirectly to development west of the UMD campus at the Adelphi Road/West Campus station, but no changes are anticipated within the UM Campus Center station indirect effects study area. No adverse indirect effects are anticipated to the UMD Historic District. Development at the East Campus station was planned independently of the Purple Line. Although current plans accommodate the station, the Preferred Alternative is not inducing the redevelopment.

The Prince George's County *Purple Line TOD Study* (M-NCPPC 2013, Draft) envisions mixed-use redevelopment at the Adelphi Road/West Campus station into a new "gateway" for the university, composed of predominantly mid-rise residential uses with ground floor retail along the south side of Campus Drive, and redevelopment could include trail linkages to surrounding community parks.

The East Campus indirect effects area is constricted by the floodplain of Northwest Branch, which must be protected in the future development plans.

Future development as a result of the Preferred Alternative would not be expected to occur in the Adelphi Road/West Campus station area. Also, it is not anticipated that there would be any substantive difference in future development under either the Preferred Alternative or the No Build Alternative for the UM Campus Center station area, which is within the established section of the UMD campus, or in the East Campus station area where the redevelopment of the East Campus was planned independent of the Purple Line and is anticipated to be undertaken under either alternative.

7.2.11 College Park and M Square Stations

At the College Park station, the WMATA public/private redevelopment efforts would not be influenced by the Preferred Alternative.

At the M Square Station, the M Square Research Park will support approximately 2 million square feet of research and office facilities and is anticipated to occur without the Preferred Alternative. The Cafritz Property at Riverdale Park development and other identified projects are likewise, not influenced by the Preferred Alternative. Development is a natural resources concern in terms of land clearing, potential water quality effects, and the protection of wetlands and floodplains associated with Northeast Branch.

This new development in these station areas will occur under the No Build alternative as well as under the Preferred Alternative.

7.2.12 Riverdale Park Station

Redevelopment of existing retail/commercial uses within a four-block area adjacent to the proposed Riverdale Park station is envisioned by the Prince George's County *Purple Line TOD Study* (M-NCPPC 2013, Draft) as an indirect effect of the Preferred Alternative. The study recommends mid-rise mixed-use developments of housing, office, and neighborhood retail with new public spaces.

Increased pedestrian and vehicular traffic and land use and economic implications could result from planned redevelopment. Indirect effects likely would include changes to the intensity of development or the timing of proposed development, due

to modifications in access and traffic patterns resulting from the Preferred Alternative. An indirect effect of the Purple Line could be the displacement of some businesses by the envisioned redevelopment. Further studies by the town and county would be required to advance the redevelopment idea, assess potential effects, and identify appropriate mitigation.

The Preferred Alternative would be expected to have long-term positive effects to the economy within the station area by creating area jobs, increasing available area housing, and improving mobility and accessibility for commuters. These benefits would apply to all area residents, including environmental justice populations.

A potential indirect effect of redevelopment in this station area is to increase pressure on the Northeast Branch floodplain. Redevelopment has the potential to increase the amount of runoff the floodplain handles as well as directly impact the floodplain by encroachment. Further studies by the town and county would be required to advance the redevelopment idea, assess potential effects on the floodplain, and identify appropriate mitigation.

Under the No Build Alternative, no substantial changes in the land use would be expected.

7.2.13 Beacon Heights Station

The Prince George's *Purple Line TOD Study* (M-NCPPC 2013, Draft) identifies minor redevelopment opportunities influenced by the Preferred Alternative in this station area. The major redevelopment opportunities are projected at the existing County Park Police Headquarters building and the East Pines Shopping Center. Redevelopment at these locations could involve multi-story residential uses with ground-level neighborhood retail.

Changes to the existing community would occur through increased pedestrian and vehicular traffic and land use and economic implications. Indirect effects likely would include changes to the intensity of development or the timing of proposed development, due to modifications in access and traffic patterns resulting from the Preferred Alternative.

The Preferred Alternative is expected to have long-term positive effects to the economy within the station area by creating area jobs, increasing available area housing, and improving mobility and accessibility for commuters. These benefits would apply to all area residents, including environmental justice populations. As described below in Section 7.4, the potential exists for rents to increase in station areas, an effect that is of most concern in environmental justice population areas.

While the institutional development potentially would occur under either the Preferred Alternative or the No Build Alternative resulting in some increase in associated economic activity, the long-term benefits to the Beacon Heights station area anticipated under the Preferred Alternative would not occur under the No Build Alternative.

7.2.14 Annapolis Road/Glenridge Station

The land area adjacent to the proposed Annapolis Road/Glenridge station supports approximately 50,000 square feet of office space and 110,000 to 140,000 square feet of retail commercial uses. The County has approved a Development District Overlay Zone to promote consistency between the goals of the *Central Annapolis Road Sector Plan* (M-NCPPC 2010) and future development. The Annapolis Road/Glenridge station is also within the state-designated Enterprise Zone.

Redevelopment of the existing Glenridge Shopping Center and surrounding areas is envisioned by the sector plan in response to the Purple Line. Glenridge Transit Village is planned to be a pedestrian-friendly, mixed-use center that supports community scale transit-oriented development and new employment and commercial opportunities centered on the Annapolis Road station area. At build-out, the village would support a total of 250,000–300,000 square feet of low-to-mid-rise office use, 400–500 housing units, and 130,000 to 190,000 square feet of commercial retail space.

Through increased pedestrian and vehicular traffic and land use and economic implications, the community would be changed. Indirect effects at the station area would include changes to the intensity of development or the timing of future

development in conjunction with the construction of the Preferred Alternative. Displacement of existing businesses would occur; the potential for water quality effects is also a concern. The Preferred Alternative is expected to have long-term positive effects to the economy. Future development would create more area jobs, increase available area housing, and improve mobility and accessibility for commuters. These benefits would apply to all area residents, including environmental justice populations.

It can be anticipated that some development would occur under the No Build Alternative as a result of the Development District Overlay Zone, but it is not anticipated that the Glenridge Transit Village would be constructed. As a consequence, the long-term positive effects to the economy would not be realized.

7.2.15 New Carrollton Station

The planned WMATA and MDOT redevelopment activities at this station are not indirectly attributable to the Purple Line.

Development would be anticipated to be the same under both the Preferred Alternative and the No Build Alternative.

Implications of Indirect Effects

While not the sole or primary driver of change, the presence of the Purple Line is likely to contribute to social and economic influences that may transform communities over time. For example, a 2006 report by the Center for Transit Oriented Development, "*Preserving and Promoting Diverse Transit Oriented Neighborhoods*," looked at communities within a one-half mile radius of transit stations (a transit zone) across the country in terms of their social and economic characteristics and documented the following findings:

- Transit zones have more racial and ethnic diversity than the average census tract in the same metropolitan area
- Housing accommodates a greater share of a region's lower-income households in transit zones than a region overall
- Transit zones support important segments of the population in terms of rental housing and household size
- Transit zones have a greater than average proportion of homeowners who spend more than 30 percent of their income on housing
- Transit zones allow people to live with fewer cars
- By 2030, nearly two-thirds of the potential demand for housing near transit is likely to come from households that have incomes below the area median income

Studies of the effect of transit on property values using sales data typically have indicated increases in residential real estate values in close proximity to stations, with a reduced influence beyond a one-half mile radius[1]. This premium depends on several factors, including the design of the station, the level of ridership, local real estate market conditions, neighborhood characteristics, and adjacent land uses. These economic effects can be a both a benefit and a burden. While implementation of the Purple Line may help communities effect positive economic growth, the diversity and the economic needs of the entire community must be considered.

Throughout the development of the Preferred Alternative, MTA has been engaged with neighborhoods and businesses along the corridor to understand their concerns. MTA will continue working with the counties and advocacy groups to support engagement of local elected officials regarding land use changes such as gentrification.

Prince George's County has recently completed the *Purple Line TOD Study* (M-NCPPC 2013, Draft) of five transit station areas to determine a future vision for these communities and to ultimately develop planning strategies that seek to build both diverse and prosperous neighborhoods. A number of public assistance programs, including home and business improvement subsidies and public infrastructure funding, are in place in Prince George's County to

[1] Public Transportation Boosts Property Values" in *Transportation: A Toolkit for Realtors*
2nd Edition, National Association of Realtors, 2012
http://www.realtor.org/sites/default/files/transportation-toolkit-2012-05-29.pdf

address priority needs related to affordable housing, economic revitalization, and public services.

The Montgomery County Moderately Priced Housing Law, in effect since 1974, has facilitated the private development of over 13,000 affordable housing units between 1976 and 2010.

Montgomery County also recently enacted legislation requiring the county to include an assessment of the potential for incorporating affordable housing into county capital projects such as libraries, fire stations, recreation centers, and parking structures.

MTA is engaging small business leaders in the Purple Line corridor in identifying opportunities and resources for technical assistance to businesses through entities such as the Maryland Small Business Development Center (see Section 4.19.5).

Related discussion of potential cumulative effects on environmental justice populations is presented in Section 7.4.

7.3 Cumulative Effects Assessment

Planned transportation and other governmental development in the cumulative effects study area is programmed or anticipated to occur independently of the Purple Line. The vast majority of these developments would be located in the Lower Rock Creek and Sligo Creek watersheds of Montgomery County and the Northwest and Northeast Branch watersheds in Prince George's County. Projections of anticipated land development are based on current local and regional land use and growth management objectives and regulations and already consider the implementation of the Preferred Alternative.

The Purple Line would have an incremental effect on resources of interest in the context of all other past, present, and reasonably foreseeable actions in the cumulative effects study area. The Preferred Alternative is not anticipated to generate substantial cumulative resource effects in the cumulative effects study area. In general, direct and indirect adverse impacts generated by the Purple Line project would be localized to the Purple Line corridor.

For example, FTA and MTA's assessment considered the potential for cumulative effects due to the effects of concurrent construction of the Bethesda Metro Station South Entrance and the Purple Line Bethesda station. As described in Chapter 2.0, Montgomery County intended to initiate construction of the Metro Station South Bethesda Station Entrance as a separate project prior to the start of the Purple Line construction. However, based on recent discussions with the county, MTA understands that the County is likely to build their project at the same time as the Purple Line so as to benefit from construction interface and cost savings. FTA and MTA's assessment of the cumulative effect of concurrent project construction would be limited to closure of Elm Street between Wisconsin Avenue and Woodmont Avenue during the construction of the shaft containing the elevators and egress stairs that connect the Metrorail station and the surface.

Throughout the planning phase of the project, MTA worked closely with agencies, institutions, and private landowners and developers to design a transit line that fits within the existing and future environment.

The assessment of potential cumulative effects of the Purple Line and other past, present, and reasonably foreseeable actions is presented by resource in the following subsections.

7.3.1 Neighborhoods and Community Facilities and Services

Cumulative effects to neighborhoods and community facilities and services would occur as a result of past, present, and reasonably foreseeable future development and changes in population and employment in the cumulative effects study area.

The primary development forces are state initiatives and local planning and zoning actions that call for development and redevelopment in many parts of the Purple Line cumulative effects study area, particularly along the Purple Line corridor. Focal points of these initiatives are the Metrorail stations and Purple Line stations in the Purple line corridor, primarily urbanized centers that are themselves growth areas. Growth and redevelopment by others and the catalytic effect of the Purple Line would

result in neighborhood change over the long term in the localized Purple Line corridor. The transit-oriented development goals of the counties will change neighborhood character through increases in the density and mix of land uses. The economic benefits of these actions have the potential to increase property values. Transit-oriented development could change the demographic profile of a neighborhood. As discussed above, these changes may be beneficial to some and a burden for others.

In large part, the Preferred Alternative plays a supporting role with incremental, localized effects compared to the larger state policies and county-driven planning actions. At some Purple Line station locations, for example and as described in Section 7.2, the Preferred Alternative would have a more prominent role in shaping neighborhood character in the Purple Line corridor. For this reason, MTA is an active participant with the counties, as well as residents and business leaders, in planning a future vision for communities in the Purple Line corridor and in developing strategies to build and maintain diverse and prosperous neighborhoods.

Population and employment growth in the cumulative effects study area, supported by state and county planning and zoning actions, is expected to increase local travel demand, traffic congestion, and demand for transit services. The Purple Line would help satisfy the transit demand and potentially would transfer some demand from private vehicles to transit service.

Forecasted population and employment growth based on state and county planning actions would increase pressure on public infrastructure and services. State and county development regulations, including state Smart Growth requirements and public facility ordinances, serve to direct future growth and limit excessive pressure on public facilities and services. Anticipating future population and employment growth, some infrastructure investments are already planned and programmed, including school additions and expansions, new and renovated fire and police stations, public health facilities, and other community enhancements. As the Purple Line is included in county master plans, the incremental demands on infrastructure from future induced growth in the Purple Line corridor would be accounted for in current infrastructure plans.

7.3.2 Parks and Recreation Facilities

Past, present, and reasonably foreseeable future county actions include property acquisition for parks, infrastructure and facility improvements, and maintenance programs. Population growth in the cumulative effects study area is expected to increase demand and capacity pressure on public parks and recreation facilities in the region. Due to limited land availability and funding for acquisitions, future park improvements by the counties and National Park Service are geared toward maximizing the use of already protected land to meet these recreational demands. These limitations have the potential to result in a long-term shortfall in the ratio of parks and recreation areas to population.

As described in Section 4.6, the Preferred Alternative would affect several parks, primarily by minor roadway widening or access modifications. No reasonably foreseeable actions by others are known to have a potential cumulative impact on parks and recreation areas in the long-term.

Considered cumulatively, the county actions would have the greatest effects on parks by providing new or expanded facilities and maintaining existing facilities in good order. The effects of the Purple Line action involve small portions of parks, primarily where the parks are adjacent to or are crossed by existing roadways. MTA is coordinating with the counties and National Park Service to assess means to avoid or further minimize park impacts and to develop effective mitigation strategies to offset adverse effects. MTA is guided by the regulations of Section 4(f) of the Department of Transportation Act of 1966 in this regard.

7.3.3 Cultural Resources

The cumulative effects study area contains 55 resources listed on the NRHP, including several historic districts, portions of the former Baltimore and Ohio Railroad, and the Baltimore Washington Parkway, along with 731 resources listed on the Maryland Inventory of Historic Places.

The potential effects of the Preferred Alternative on historic resources are described in Section 4.7; resources of interest adversely affected by the Preferred Alternative are the Talbot Avenue Bridge; the Metropolitan Branch, B&O Railroad; and the Falkland Apartments. Future actions other than the Purple Line have the potential to adversely affect cultural resources in the cumulative effects study area. However, no known public actions also would affect the Talbot Avenue Bridge; the Metropolitan Branch, B&O Railroad; or the Falkland Apartments. MTA is guided by Section 106 of the National Historic Preservation act and Section 4(f) of the Department of Transportation Act of 1966 in regard to avoiding or minimizing adverse effects.

Table 7-6. Change in Forested Land within the Cumulative Effects Study Area

Cumulative Effects Study Area	2002 Forest acres	2002 percent of land area that is forest	2010 Forest acres	2010 percent of land area that is forest	2002-2010 Percent change in forest cover
Little Falls	498	10%	508	10%	2%
Rock Creek	N/A	N/A	N/A	N/A	N/A
Lower Rock Creek	1,064	9%	1,017	9%	-4%
Sligo Creek	646	9%	579	8%	-10%
Northwest Branch	2,191	15%	2,529	17%	15%
Northeast Branch	2,926	20%	2,639	18%	-10%
Lower Beaverdam	891	17%	682	13%	-23%
Cumulative Effects Study Area Totals	8,216	14%	7,954	14%	-3%

Note: Rock Creek information is not available and was thus not included in the totals or average percentages.

Source: MDP, 2011

Table 7-7. Potential Cumulative Effects to Forested Land

Cumulative Effects Study Area	Total Size (ac)	2010 Forest (ac)	Forest percentage of subwatershed	Forest acres in projected growth areas	Percent of subwatershed forest lands in projected growth areas
Little Falls	5,131	508	10%	27	5%
Rock Creek	NA	NA	NA	NA	NA
Lower Rock Creek	11,702	1,017	9%	176	17%
Sligo Creek	6,936	579	8%	24	4%
Northwest Branch	14,634	2,529	17%	173	7%
Northeast Branch	14,246	2,639	19%	774	29%
Lower Beaverdam	5,287	682	13%	383	56%
Cumulative Effects Study Area Totals	57,936	7,954	14%	1,557	20%
Preferred Alternative Forest Impacts	47.6 ac (0.6 percent of cumulative effects study area forest land)				

Note: Rock Creek information is not available and was thus not included in the totals or average percentages.

7.3.4 Forests

Within the cumulative effects study area, forest cover trends between 2002 and 2010 generally mirror the statewide trends, with an overall 3 percent reduction in forest cover (Table 7-6).

The potential growth areas within the cumulative effects study area are generally locations without extensive forest coverage (Table 7-7) or are locate in areas with some forest protections in place. Forest-related habitat and ecological functions are associated largely with the protected stream valley parks. A number of other forested lands, for example the Indian Creek stream valley south of the Greenbelt Metrorail station, are at risk for development. A large forested tract already has been impacted by the recently developed 245-acre mixed use Woodmore Town Centre at Glenarden.

Calculating the foreseeable forest impacts in the cumulative effects study area finds that the

Preferred Alternative would directly affect approximately 0.6 percent of the forest land, largely through construction within the Georgetown Branch right-of-way and roadside strip acquisitions. MTA is guided by the Maryland Natural Resources Article Section 5-1601 through 5-1613, known as the Maryland Forest Conservation Act, which regulates development impacts to forest land as well as the use of the Georgetown Branch right-of-way.

7.3.5 Floodplains

Within the cumulative effects study area, floodplains generally are associated with the stream valley parks (Table 7-8). Historically, floodplains have been impacted by urban development. More recent threats include the Indian Creek stream valley, which is partly a focal point for future transit-oriented development. The Beaverdam Creek floodplain in the vicinity of the Cheverly Metrorail station appears to have been reduced through a recent warehouse development.

The potential effects of the Preferred Alternative on floodplains are described in Section 4.14; impacts are primarily at perpendicular crossings where existing roadway widening and improvements to address pre-existing flooding problems are proposed. Purple Line impacts to floodplains would total 10.9 acres, or approximately 0.2 percent of the floodplains acreage within the cumulative effects study area. Future actions other than the Purple Line have the potential to adversely affect floodplains in the cumulative effects study area. However, no known actions would affect the same floodplains. MTA is guided by current state and county laws and regulations regarding floodplains. MTA is striving to minimize floodplain impacts and will be required to obtain stormwater management permits prior to construction.

7.3.6 Water Quality

Each of the subwatersheds within the cumulative effects study area contains large areas of urban land use and impervious coverage, which contribute to water quality degradation as discussed in Section 4.14. Natural water quality buffers for surface waters are generally limited to the stream valley parks. Water quality impairments occur in each of the three major watersheds (Potomac River, Rock Creek, and Anacostia River), related to the urbanized nature of the cumulative effects study area. Future development by others would be regulated by state water resources laws intended to protect waterways and water quality.

MTA would be subject to the same laws and regulations in the implementation and operation of the Purple Line. Direct effects on surface waters are anticipated to be minor and localized, mainly associated with temporary construction activities and stormwater runoff from newly created impervious surfaces at stations and yards. MTA has sought to minimize new impervious surfaces and would obtain applicable Maryland Department of the Environment permits, would address stormwater management, and aim to protect water quality and important aquatic resources. Consequently, the role of the Purple Line in cumulative

Table 7-8. Potential Cumulative Effects to Floodplains

Cumulative Effects Study Area	Total Size (ac)	2010 Floodplain (ac)	Floodplain percentage of subwatershed	Floodplain acres in projected growth areas	Percent of floodplains in projected growth areas
Little Falls	5,131	581	11%	1	<1%
Rock Creek	11,346	572	5%	0	0%
Lower Rock Creek	11,702	748	6%	115	15%
Sligo Creek	6,936	154	2%	0	0%
Northwest Branch	14,634	1,561	11%	220	14%
Northeast Branch	14,246	1,727	12%	1,003	58%
Lower Beaverdam	5,287	244	5%	88	36%
Cumulative Effects Study Area Totals	69,282	5,587	8%	1,427	26%
Preferred Alternative Floodplain Impacts	10.9 acres (0.2 percent of cumulative effects study area floodplains)				

effects on surface water resources is negligible given the current and proposed amount of urban development.

7.3.7 Wetlands

Recent estimates of wetlands trends in Maryland watersheds note decreased rates of wetland loss and some gains due primarily to wetland creation required through wetland permit mitigation (Table 7-9). Between the years 1991 and 2000, the State of Maryland and the major watersheds intersecting the cumulative effects study area all exhibited net gains in wetland acreage.

Overall, the percentage of wetlands in the cumulative effects study area is typical of a largely urbanized area (Table 7-10). Most of the wetland acreage within the cumulative effects study area is included in stream valley parks and other public lands, which are protected areas not subject to future development. Other wetlands typically are small systems remaining as remnants within generally urbanized environments. However, several future potential growth areas contain a comparatively substantial amount of wetlands.

Within the cumulative impact study area, the only wetland known to be susceptible to foreseeable development is along the Indian Creek stream valley (Northeast Branch), where transit-oriented development at the Greenbelt Metrorail station is a potential threat to the wetlands.

The Preferred Alternative is projected to directly permanently affect 0.6 acres of wetlands, approximately 0.03 percent of the wetland acreage within the cumulative effects study area. The anticipated mitigation requirements would entail an estimated 0.7 acres of wetland compensation, resulting in an approximately 0.1 acre net gain in wetlands within the cumulative effects study area. MTA would be required to obtain permits under Section 404 permit of the federal Clean Water Act, the Maryland Nontidal Wetlands Protection Act, and county level regulations.

Table 7-9. Wetland Status and Trends of Tributary Basins within Cumulative Effects Study Area between 1991 and 2000

Geography	MD 8-Digit Watershed	Total Acres of Permanent Loss	Total Acres of Gains	Net Gain/Loss
Potomac River — Montgomery Co	02140202	- 2.49	13.84	11.35
Rock Creek	02140206	-1.88	2.44	0.56
Anacostia	02140205	-23.25	35.48	12.23
Maryland	NA	-378	645	267

Source: MDNR Surf Your Watershed http://dnr.maryland.gov/watersheds/surf/

Table 7-10. Potential Cumulative Effects to Wetlands

Cumulative Effects Study Area	Total Size (acres)	2010 Wetland (acres)*	Wetland Percentage Of Subwatershed	Wetlands in Projected Growth Areas (acres)	Percent of Subwatershed Wetland Lands In Projected Growth Areas
Little Falls	5,131	513	10%	2	<1%
Rock Creek	11,346	30	<1%	0	0
Lower Rock Creek	11,702	252	2%	59	23%
Sligo Creek	6,936	15	<1%	3	20%
Northwest Branch	14,634	372	3%	15	4%
Northeast Branch	14,246	740	5%	316	43%
Lower Beaverdam	5,287	56	1%	24	43%
Cumulative Effects Study Area Totals	69,282	1978	3%	419	21%
Preferred Alternative Wetland Impacts	0.6 acres (0.03% of cumulative effects study area wetlands)				

*Note: 2010 wetland acreages are MDNR wetlands, except for Rock Creek which reflects NWI wetlands

7.4 Environmental Justice

As described in Section 7.2, potential indirect effects to environmental justice populations could include increased business expenses (e.g., rents) from increased property values, business migration and displacement, changes in the availability and affordability of housing stock, and changes in neighborhood character in the indirect effects study area.

Over time, additional economic and employment opportunities would be expected to capitalize on the location advantages, and the effects of increased expenses would be offset through increased customer markets for local businesses (see Section 7.2.9, for example). MTA is committed to working with communities and other partner agencies and organizations to plan for the implications of future shifts in social and economic influences that may transform communities over time.

Land use and zoning decisions made by the counties and cities in the corridor also may affect the stock and affordability of local housing. A potential indirect effect to EJ populations would be a reduction in affordable housing as a result of redevelopment of existing housing and increased commercial rents and property values. MTA supports appropriate development around stations. However, a goal of the project is to serve transit-dependent communities, many of which are low-income. MTA has discussed concerns regarding the preservation of affordable and low-income housing with both Montgomery and Prince George's Counties. MTA will continue working with the counties to address concerns as the project moves forward.

Statistically, the percentages of minority and low-income populations in the cumulative effects study area generally mirror those in the potential growth areas and in the Preferred Alternative study area, as discussed in Section 4.19 Environmental Justice, with community percentages generally increasing from west to east (Table 7-11).

Table 7-11. Environmental Justice Characteristics in the Cumulative Effects Study Area

Cumulative Effects Study Area	Percent Minority	Percent Below Poverty	Percent Minority in Potential Growth Areas	Percent Below Poverty in Potential Growth Areas
Little Falls	15%	4%	10%	3%
Rock Creek	45%	11%	65%	12%
Lower Rock Creek	35%	6%	40%	7%
Sligo Creek	56%	10%	60%	14%
Northwest Branch	63%	12%	72%	16%
Northeast Branch	67%	12%	53%	18%
Lower Beaverdam	89%	11%	92%	11%
Totals	53%	10%	58%	13%

Source: 2010 Census and 2006-2010 American Community Survey

As described in Section 7.3.1, cumulative effects to neighborhoods and community facilities and services would result from additional residential and commercial/employment development in the cumulative effects study area. Again, the Preferred Alternative plays a supporting role primarily within the Purple Line corridor with incremental effects compared to the larger state and county-driven planning actions. Yet at some Purple Line station locations, such as Chevy Chase Lake, Lyttonsville, Woodside/16th Street, Long Branch, Piney Branch Road, Takoma/Langley Transit Center, Riggs Road, Adelphi Road/West Campus, M Square, Riverdale Park, Beacon Heights, and Annapolis Road/Glenridge, the Preferred Alternative has a more prominent role in shaping neighborhood character. With the exception of Chevy Chase Lake, these station areas include substantial environmental justice populations, with the minority population ranging from 33 percent in College Park to 86.4 percent in West Lanham Hills, and those living below poverty ranging from 6.5 percent in Glenridge/Beacon Hills to 23.6 percent in College Park. For this reason, MTA is working with the counties, as well as residents and business leaders, in planning a future vision for communities in the Purple Line corridor and in developing strategies to build diverse and prosperous neighborhoods.

An example of this activity is the coordination between MTA and the Lyttonsville community in the development of the Lyttonsville master plan. As there is considerable employment in Lyttonsville in light industrial enterprises and public infrastructure maintenance facilities, the community is considering how to attract more business and commercial employment opportunities, with the Purple Line station as an asset. Through this planning effort and MTA's ongoing community engagement activities, the community would not experience cumulative, disproportionately high or adverse effects from land use and growth caused by the Purple Line.